INTERNATIONAL STANDARD

ISO 4531-2

First edition
1998-10-01

Vitreous and porcelain enamels — Release of lead and cadmium from enamelled ware in contact with food —

Part 2:
Permissible limits

Émaux vitrifiés — Émission de plomb et de cadmium d'articles émaillés en contact avec les aliments —

Part 2: Limites admissibles

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 4531-2 was prepared by Technical Committee ISO/TC 107, *Metallic and other inorganic coatings*, Subcommittee SC 6, *Vitreous and porcelain enamels*.

ISO 4531 consists of the following parts, under the general title *Vitreous and porcelain enamels — Release of lead and cadmium from enamelled ware in contact with food*:

— *Part 1: Method of test*

— *Part 2: Permissible limits*

The Bibliography is for information only.

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Introduction

The problem of lead and cadmium release from enamelled ware requires effective means of control to ensure the protection of the population against possible hazards arising from the use of improperly formulated, applied and fired enamels and/or decorations on the food contact surfaces of enamelled ware used for the preparation, serving and storage of foodstuffs.

As a secondary consideration, different requirements from country to country for the control of the release of toxic materials from the surfaces of enamelled ware present non-tariff barriers to international trade in these commodities. Accordingly, there is a need to establish internationally accepted permissible limits for the release of lead and cadmium from enamelled ware.

An expert panel convened by the World Health Organization (WHO) met in Geneva, in June 1976, and recommended the adoption of sampling methods, testing procedures and limits for the release of toxic materials from ceramic ware [3]. A further meeting was convened by the WHO in November 1979 [4].

The permissible limits given in this International Standard are based on those WHO recommendations, because it was the sense of the WHO meeting that the term "ceramic" includes ceramics, glass, vitreous enamels and glass ceramics. However, the permissible limits have been reduced. As the capability of the industry increases, further efforts will be made to reduce these limits for lead and cadmium release.

If WHO recommendations were to include hot testing at any time then a new edition of this part of ISO 4531 should be considered. For the time being the cold test is also applied for cookware with reduced limit values compared with those specified for other foodware [5].

Vitreous and porcelain enamels — Release of lead and cadmium from enamelled ware in contact with food —

Part 2:
Permissible limits

1 Scope

This part of ISO 4531 specifies permissible limits for the release of lead and cadmium from enamelled ware intended for use in contact with food (including drinks).

This part of ISO 4531 is applicable to enamelled foodware including tanks and vessels which are intended to be used for the preparation, serving and storage of food.

This part of ISO 4531 also specifies permissible limits for the release of lead and cadmium from a drinking rim.

It is not applicable to ceramic ware, nor to glassware and glass ceramic ware.

2 Normative Reference

The following normative document contains provisions which, through reference in this text, constitute provisions of this part of ISO 4531. For dated references, subsequent amendments to, or revisions of, this publication do not apply. However, parties to agreements based on this part of ISO 4531 are encouraged to investigate the possibility of applying the most recent edition of the normative document indicated below. For undated references, the latest edtion of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 4531-1, *Vitreous and porcelain enamels — Release of lead and cadmium from enamelled ware in contact with food — Part 1: Method of test.*

3 Definitions

For the purposes of this part of ISO 4531 the definitions specified in ISO 4531-1 apply.

4 Permissible limits

4.1 General

A vitreous or porcelain enamelled article shall be recognized as satisfying the requirements of this part of ISO 4531 if the quantities of lead and/or cadmium when determined by the method specified in ISO 4531-1 do not exceed the permissible limits given in 4.2 to 4.4.

However, where a vitreous and porcelain enamelled article does not exceed the values given in 4.2 to 4.4 by more than 50 %, that article shall nevertheless be recognized as satisfying the requirements of this part of ISO 4531 if at least three other articles identical to this one in material, shape, dimensions and decoration are tested under the conditions laid down in ISO 4531-1 with the result that the arithmetic mean of lead and/or cadmium release for those articles does not exceed the permissible limits and none of those articles exceeds the permissible limits by more than 50 %.

4.2 Enamelled ware

Table 1 — Permissible limits of the lead and cadmium release from enamelled ware in contact with food

Type of enamelled ware		**Maximum lead release**		**Maximum cadmium release**	
		mg/dm^2	mg/l	mg/dm^2	mg/l
Foodware without cook ware	Flatware	0,8		0,07	
	Hollow ware (up to 3 l)		0,8		0,07
Cook ware	Flatware	0,1		0,05	
	Hollow ware (up to 3 l)		0,4		0,07
Tanks and vessels (capacity over 3 l) tested by flat specimen		0,1		0,05	

NOTE The values given in table 1 are expressed in milligrammes per square decimetre of the reference surface area for flatware and in milligrammes per litre of extraction solution for hollow-ware.

4.3 Drinking rim

When the drinking rim is tested as specified in ISO 4531-1, enamelled articles shall not cause the substances given in table 2 to be released into the test solution in quantities exceeding those stated.

Table 2 — Permissible limits for drinking rim

Lead mg per article	**Cadmium** mg per article
2,0	0,20

4.4 Receptacles with lid

If a receptacle is provided with a lid, the receptacle alone and the inner surface of the lid shall each be tested on its own according to ISO 4531-1. The sum of the two extraction values calculated in milligrammes for lead and/or cadmium shall be related, depending on the case concerned, to the surface area or to the volume of the receptacle alone. The permissible limit for the lead and/or cadmium release, in milligrammes per square decimetre or in milligrammes per litre, shall be deemed to be the value applying to the receptacle alone.

Bibliography

[1] ISO 6486-2:1986, *Ceramic ware, glass-ceramic ware and glass flat ware in contact with food – Release of lead and cadmium – Part 2: Permissible limits.*

Glass hollow ware in contact with food – Release of lead and cadmium – Part 2: Permissible limits.

[3] WHO/Food Additives 77.44. *Ceramic Foodware Safety, Sampling, Analysis and Limits for Release* (Report of a WHO meeting, Geneva, 8 – 10 June 1976).

[4] WHO/Food Additives HCS/79.7. *Ceramic Foodware Safety, Critical Review of Sampling, Analysis and Limits for Lead and Cadmium Release* (Report of a WHO meeting, Geneva, 12 – 14 November 1979).

[5] FREY, E., and SCHOLZE, H., *Blei- und Cadmiumlässigkeit von Schmelzfarben, Glasuren und Emails in Kontakt mit Essigsäure und Lebensmitteln und unter Lichteinwirkung* [Lead and cadmium release from fused colours, glazes and enamels in contact with acetic acid and foodstuffs and under the influence of light]. Bericht Deutsche Keramische Gesellschaft, 1979 (vol. 56), pp. 293-297.

[2] ISO 7086-2:1982,

ICS 25.220.50; 67.250; 97.040.60

Descriptors: coatings, kitchen utensils, food-container contact, enamels, vitreous enamels, porcelain enamels, toxic substances, released substances, lead, cadmium, permissible limits.

Price based on 3 pages